Each of the central hubs contains several independent fluid pathways or passages (e.g., through holes 22, 62 and holes 23, 63 of the central hubs) that interconnect with like passages on subsequent hubs during assembly. The interlocking nature of the hubs forces the fluid pathways to be consistent throughout the assembly such that all fluid pathways maintain independence from one another. Specifically, a single fluid pathway is formed inside the assembled set of hubs that communicates with all the expressing bags or chambers (through holes 23, 63). Further, each processing chamber or bag has a unique and independent fluid pathway through the assembled set of hubs (through holes 22, 62).

The multiple processing chamber set (bag set) is defined as any number of processing bags and associated expressing bags assembled together with central hubs in place. The steps of assembling expressor bags are depicted in Figs. 3 and 4. Fig. 3 is a side view of the expressor bag assembly, showing the weld rings 30 prior to joining with the expressor bag/central hub assembly 31 (left view) and after joining (right view) to form a fully assembled expressor bag assembly 32. Fig. 4 is a perspective view of one side of the expressor bag assembly, showing the expressor bag/central hub assembly 41 (right view) prior to joining with the weld ring 40, and after the joining (left view) to form a fully assembled expressor bag assembly 42. Likewise, the steps of assembling processing bags are depicted in Figs. 7 and 8. Fig. 7 is a side view of the processing bag assembly, showing the weld rings 70 prior to joining with the processing bag/central hub assembly 71 (left view) and after joining (right view) to form a fully assembled processing bag assembly 72. Fig. 8 is a perspective view of one side of the processing bag assembly, showing the processing bag/central hub assembly 81 (left view) prior to joining with the weld ring 80, and after the joining (right view) to form a fully assembled processing bag assembly 82.

Once a bag set has been completely assembled by arranging the desired number of processing bag assemblies and expressor bag assemblies, two specific central hubs are mounted, one at each end of the bag set. The central hub furthest from the fluid entry point serves to terminate the fluid pathways, i.e., it is a terminal hub. The central hub closest to the fluid entry point serves as an interface between the bag set and the fluid pathway external to the centrifuge, i.e., it is a fluid entry hub. A completed bag set assembly 90 (i.e., a multiple

processing chamber set) is depicted in Fig. 9. Fluid entry hub 91 forms the interface between a multi-lumen tube 93 and the assembled processing/expressor bags 92. The multi-lumen tube preferably includes at least as many lumens as there are processing and expressor bags.

In yet another embodiment, multiple sets of expressor bag and processing bag combinations are assembled in a 1:1 ratio, except that the processor bag is sized smaller than the expressor bag and is placed within the expressor bag, yielding a "bag within a bag" assembly illustrated in Figs. 10-12.

As shown in these figures, the bag within a bag assembly 94 includes the outer expressor bag 96, an inner processing bag 98, outer weld rings 100, inner weld rings 102 and hub 104. At the center axis, a conduit 106 allows an expressor fluid to be pumped into (and out of) the expressor bag, so that ports 108 allow the supernatant or separated components to flow out of the processing bag via conduit 110.

The hub is designed so that multiple assemblies may be assembled together. Specifically, one side of the hub includes a recess 112 while the other side includes a protruding portion 114 of the conduit 106. Thus, the recess 112 receives a corresponding protruding portion 114 of an adjacent bag within a bag assembly.

The invention further includes methods for independently and simultaneously processing multiple samples in a centrifugal device. In particular, the invention provides for the use of a multiple processing chamber set in the processing of biological cells according to defined protocols in a cell processing device. The methods are useful for cell washing, blood component separation, blood component processing, including enzymatic conversion of the blood type of red blood cells (e.g., types A, B or AB to type O red blood cells), pathogen inactivation of biological fluids or cells, and the like. The methods utilize a defined processing protocol that involves adding one or more samples to the processing bags of the multiple processing chamber set, optionally centrifuging the samples, optionally expressing a supernatant formed by the centrifugation, adding one or more process chemicals or fluids, etc. Processing protocols are known to those of skill in the art, and an exemplary method follows.

The method of separating or processing samples can be defined in several steps subsequent to the assembly of the bag set. The initial step involves mounting the bag set into a continuous fixed volume centrifuge. The fluid (e.g., blood) to be separated or processed is drained, pumped or otherwise loaded into the processing chambers or bags and the components separated using centrifugation. For expression of supernatant fluid or separated components, the centrifuge is slowed to expression speed while the component interface is maintained. At this point, expressor fluid (see, e.g., PCT patent application PCT/US98/10406) is delivered into the expressor bags, preferably via a metered pump. As the expressor fluid fills the expressing bags, the overall volume of the centrifuge compartment available to the processing bags is reduced proportionally. Thus, because of the fixed centrifuge volume, as the expressor fluid fills the expressing bags, the contents of the processing bag are emptied or expressed. Further, the contents of the processing bags are expressed preferentially from least dense to most dense due to the centrifugation and the fact that expressor fluid is denser that the densest component held within the processing chamber.

The expressor fluid may include two fluid components that, when mixed together, create a fluid that is heavier than the heaviest component of the biological sample. For example, if the biological sample is blood, the two fluid components mixed create a fluid heavier than the red blood cell component (i.e., the heaviest component) of blood, so that all the components of the blood (e.g., red blood cells, white blood cells, palettes) may be separated and removed from the processing bags.

However, if only certain components of the biological sample are required to be separated, then the expressor fluid may not be required to be heavier than the heaviest component of the sample. For example, if red blood cells are the only component that required separation from a blood sample, then an expressor fluid comprised substantially of air may be used.

Thus under centrifugal force the expressor fluid will fill the expressor bags from the outermost radial portion inward to the innermost radial portion as disclosed in PCT patent application PCT/US98/10406. Finally, as the expressor bags fill from the outermost radial portion inward, the reduced volume within the processing bags causes the fluid at the